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Juxtaposition computer installing **system in computer network** - installs **portion of group head quarters and sequentially starts remaining group**

Patent Assignee: HITACHI LTD (HITA); HITACHI SOFTWARE ENG CO LTD (HISF)
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Patent Family:

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JP 11296349	A	19991029	JP 9895690	A	19980408	200003	B

Priority Applications (No Type Date): JP 9895690 A 19980408
Patent Details:

Patent No	Kind	Lan	Pg	Main IPC	Filing Notes
JP 11296349	A		8	G06F-009/06	

Abstract (Basic): JP 11296349 A

NOVELTY - A node (2) in the juxtaposition computer system starts using independent system disc. A portion of group head quarters is **installed** first and is started in short time. The server then automatically **installs** one node after another sequentially. Simultaneous **installation** of nodes is also done.

USE - In computer network.

ADVANTAGE - Shortens **installation** time as the data required for **installation** is contained independently in each discs. Even when **number** of **nodes** **increases** , the operation is not made complicated. DESCRIPTION OF DRAWING(S) - The figure shows classification of object that is to be **installed** to **group** head quarters. (2) **Node** .

Dwg.1/5

Title Terms: JUXTAPOSE; COMPUTER; **INSTALLATION** ; SYSTEM; COMPUTER; NETWORK ; PORTION; GROUP; HEAD; QUARTER; SEQUENCE; START; REMAINING; GROUP
Derwent Class: T01
International Patent Class (Main): G06F-009/06
International Patent Class (Additional): G06F-001/00; G06F-009/445; G06F-015/16
File Segment: EPI

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Notes:
1. Untranslatable words are replaced with asterisks (****).
2. Texts in the figures are not translated and shown as it is.

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Dictionary: Last updated 04/07/2006 / Priority: 1. Information communication technology (ICT) / 2. Electronic engineering / 3. JIS (Japan Industrial Standards) term

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FULL CONTENTS

[Claim(s)]

[Claim 1] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk It is the installation method characterized by installing the extension at the arbitrary times after managing the installation situation of the extension for the object which each node should install by an installation management data set in distinction from a fundamental part and the extension and installing a fundamental part.

[Claim 2] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk Put an installation control program on each node, and After installation of a fundamental part, The client function which requires a non-installed portion of other nodes when the load of the self-node has not carried out the completion of installation of the extension below in a threshold, [having the server function which transmits the portion demanded in the portion as which the load of the self-node was required from other nodes below as for the threshold case / which has been installed by the self-node] The parallel installation method of the parallel computer characterized by determining the relation between a client and a server by nodes automatically, and installing the extension in the background of calculation business after the system startup of a parallel computer.

[Claim 3] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk Put an installation control program on each node, and the load of a self-node Below a threshold and when all the extensions are installed and either of the other nodes has not carried out the completion of installation of the extension A self-node notifies the other nodes concerned that it can grow into the server of installation. Have the server function which receives the demands of a non-installed portion from the other nodes concerned, and transmits the demanded portion, and [the background of calculation business] after the system startup of a parallel computer The installation method characterized by determining the relation between a client and a server by nodes automatically, and installing the extension.

[Claim 4] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk When an installation object node management data set is prepared in each node and the self-node has left installation of the extension When installation is required only of the node defined as a server candidate and all the extensions are installed conversely The installation method which installs an extension with it being local and is characterized by making it go on in parallel because a self-node notifies only the node defined as a client candidate that it can grow into the server of installation.

[Claim 5] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk [the node management function which controls distribution of the parallel job which is the unit divided into the form where one calculation business can be performed in parallel by two or more nodes] The node quota method characterized by assigning only the node which has installed software required for execution of a parallel job using an installation management data set.

[Claim 6] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk When a user specifies clearly the node which performs a parallel job, a node management function uses an installation management data set. The installation method characterized by whether software required in order to perform a parallel job is installed, and performing the parallel job concerned after installing required software, if it investigates, and not installed.

[Claim 7] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk The installation control method kept from having a bad influence on calculation business by notifying the stop of installation to a partner node when an installation control program is put on each node and the load of a self-node exceeds a threshold after an installation start.

[Claim 8] In the parallel computer system which consists of nodes which have the system disk with which each became independent, and perform a system startup using the disk CPU, the channel to which a system disk is connected, and adapter which compete on installation and calculation business, And the installation control method characterized by judging a start and stop of installation by the valuation plan which computes the load of system resources, such as a communication line and LAN, as a ratio of the accumulating totals of the hour of use of the resources concerned, and measuring time, and performs weight attachment to those ratios.

[Detailed Description of the Invention]

[0001]

[Field of the Invention] Especially this invention aims at shortening of time required by the system startup of a parallel computer about installation of a parallel computer, and the remaining extensions are related with the parallel installation method which can carry out two or more installations in parallel automatically after a system startup.

[0002]

[Description of the Prior Art] About the installation system in a computer network, environmental definition processing information peculiar to a terminal system is also transmitted to each terminal system from the managerial system side, and the method which fully automates the installation work of a terminal system is proposed by JP,H5-81036,A, for example. Similarly, to JP,H6-309261,A, starting of an installation start is applied from a server machine, and the method installed in all the client machines at once is proposed. Furthermore, the method which performs installation from a primary-station computer apparatus simultaneously to two or more secondary-station computer apparatus is proposed by JP,H6-59994,A. Each of these proposals has the purpose which installs in two or more clients installed in the remote place at once from the server of installation work, and reduces operations of a client side.

[0003]

[Problem to be solved by the invention] The purpose of a parallel computer is to divide large-scale calculation business into plurality, and to process it in parallel, and the node number which constitutes a parallel computer may amount also to 1,000 sets. If fundamental software, such as OS and a node control program, is not installed in all these nodes A parallel computer system cannot be started, but since it is necessary to install calculating software in parallel with all the nodes etc. in order to start full-scale parallel calculation business, the time to the completion of installation increases with increase of a node number. If a system is tested waiting and after that till the completion of installation like the above-mentioned well-known example for a long time, when fault will be found by a test and installation will be redone, it becomes impossible to disregard time to waste, although this time is required. That is, in the case of a parallel computer system, even if a node number increases, the environment in which a system startup is possible is built for a short time, and it needs to enable it to start the test and employment of a system at an early stage.

[0004] on the other hand -- the above-mentioned well-known example -- one set of a server -- many clients -- order -- or although automation of installation is attained by installing simultaneously CPU which will start a server if a node number increases, disk accessing, and the load of a communication line concentrate, and there is a problem which installation time will increase exponentially if a certain node number is exceeded, or lapses into dead lock status. Even if it is going to prepare two or more nodes used as the server of installation to this problem and is going to avoid load concentration, within the limits of the above-mentioned well-known example, operation of each server is needed and there is a problem that operability gets worse. When it increases also to it, for example, a node number increases about to 1,000, which node is used as a server and there is a problem that it becomes difficult to decide the scenario of the installation work in what kind of procedure to start itself.

[0005] This invention is a thing in the parallel computer which shortens time until it solves the above-mentioned problem and starts full-scale calculation business which carries out the installation method realization.

[0006]

[Means for solving problem] If fundamental software, such as OS and a node control program, is installed in all the nodes of a parallel computer Also before installing calculating software in parallel with all the nodes etc., the test on employment etc. can be carried out and the check of small-scale calculation business only using the node which finished installing parallel calculating software etc. can also be performed. After classifying into a fundamental part indispensable to the system startup of a parallel computer, and the extension installable at the arbitrary times after starting a parallel computer all the objects which should be installed according to this invention paying attention to this point By installing only a fundamental part in all the nodes, the test of the built system of a parallel computer is carried out in parallel to installation of the remaining extensions at an early stage, and it enables it to reduce time to waste even when fault is found.

[0007] Moreover, in this invention, all nodes could grow into the server of installation, and the client automatically, and have eased a burden called operation of installation to many nodes, and making a scenario by enabling execution of two or more installations in parallel by non-piped mode operation.

[0008]

[Mode for carrying out the invention] Drawing 1 shows the composition of a parallel computer. The node which consists of a CPU, a disk, etc. is connected to the parallel computer system 1 in plurality and the high-speed internal network 11. For example, node (1) 2 consist of node computer equipment (1) 21, a system disk 22, and a device 23 for installation. high-speed -- an internal network -- 11 -- a node -- (-- two --) -- three -- a node -- (-- three --) -- four -- a node -- (-- four --) -- five -- a node (n-1) -- six -- a node -- (-- n --) -- seven -- connecting -- having -- **** . The system disk 22 of all the nodes, 32, 42, 52, --, after completing fundamental installation of OS, a node control program, etc. to 62 and 72, the system startup of the parallel computer system of drawing 1 becomes possible.

[0009] First, although the device 23 for installation which node (1) 2 have is used and being installed on the system disk 22 of a self-node It is not in the state where other nodes only have the firmware in which installation through the high-speed internal network 11 is possible, and software, such as OS of an old version, at this time, and a system can be employed. For this reason, next, node (1) 2 install in the system disk 32 of a node besides them, and 42 by transmitting data peculiar to each of the software which it finished installing in the self-node, and other nodes to node (2) 3 or node (3) 4 grade.

[0010] In one example of this invention if the system startup as a parallel computer becomes possible The point that the operation test which made small the test and computation scale on employment before beginning full-scale parallel calculation becomes possible is noted. Installation time is shortened by starting the pre-preparation which performs full-scale parallel calculation business, without installing only a fundamental part in all the nodes, and waiting for the completion of installation of the remaining extensions probably.

[0011] Drawing 2 is the example of a classification of the fundamental part and the extension for all which should be installed. Resources which each node computer equipment has, such as CPU and memory, are managed, the node control 111 has selection of the target node, the communication facility between nodes, etc., and all of the OS nucleus 101 classified into a fundamental part are indispensable to the system startup of a parallel computer. What is necessary is just to, prepare the OS extension 102, the command 103, and library 104 which are classified into the extension on the other hand, when necessity is not at the time of the time of starting of a node, or node control, either and it is needed by the test after a system startup etc. at the latest. What is necessary is similarly, just to prepare them, when the parallel-control program execution monitor 112, the communication library 113, and parallel DEBAGA 114 which are classified into the extension are also needed by the test of a parallel calculation program etc.

[0012] Since it can predict that in the usual case the quantity of a fundamental part is slight compared with the quantity of the extension, and the increase of stock of the extension easily endures the increase of stock of a fundamental part also in the future, the invention of Claim 1 can shorten this time by a system startup.

[0013] In other examples of this invention, it requires that the node which has left the portion which has not been installed should transmit a non-installed portion to other nodes, and the extension is installed. Installation of the extension is performed in the background of business by the installation control program put on each node according to an installation management data set and an installation object node management data set.

[0014] Drawing 3 shows the example of operation in the state where installation of the extension is not completed. Node (2) It is shown that the installation management data set 35 of 3 has installed OS extension, the command, library, and communication library of a check state, and the execution monitor which still is not in a check state, and parallel DEBAGA have not installed it. Similarly it is shown that installation of only a library and a communication library has completed the installation management data set 45 of node (3) 4.

[0015] First, at the time of an operation start, the installation control program 44 of node (3) 4 reads the installation management data set 45 and the installation object node management data set 46 used by invention of Claim 4, and compounds the server management data set 47. The server management data set 47 is the two-dimensional array which shows a node with clear having it for installation. In order for the installation management data set 45 and the installation object node management data set 46 to make the burdens of the system concerning file read-out or decode reduce to the ability to take the form of a file and customize, the bit map form which the installation control program 44 tends to process is taken.

[0016] Node (3) The installation control program 44 of 4 computes the loaded condition of a self-node by invention of Claim 8 after an operation start and the pause of fixed time, and with [control program] a threshold [below], it investigates the server management data set 47. It gets to know not being installed with not checking OS extension of the server management data set 47, and the intersection 201 of a self-node. (If it is over the threshold, a fixed time pause will be carried out and installation will be tried again.) Next, it follows in order of a definition of a server candidate from the server management data set 47, and the server candidate concerned and the server candidate by whom the intersection of OS extension is checked are looked for. A server candidate in the example of drawing 3 (If the server candidate who has OS extension in this case is found, the installation execution demand which requires transmission of OS extension will be transmitted to the node concerned, and installation will be started.) [a node (2)] Since the intersection 202 with OS extension is not checked, it judges that the server candidate (all) does not have OS extension, and processing of a substance check is started. In the example of drawing 3, the installation control program 44 of node (3) 4 transmits the substance acknowledge request of OS extension to node (2) 3.

[0017] Node (2) The installation control program 34 of 3 ignited by reception of the substance acknowledge request from node (3) 4 [the server management data set 37 compounded from the installation management data set 35 and the installation object node management data set 36] It gets to know whether

OS extension and the intersection 211 of the self-node are checked, and that investigated and demanded OS extension is installed in a self-node, and the installable response which shows that the portion required of node (3) 4 can be transmitted is transmitted. (If OS extension is not installed in a self-node, the non-installed response which shows that there is no OS extension is transmitted.) Node (3) [the installation control program 44 of 4] Node (2) Receive installable responses from 3 and OS extension of the server management data set 47 and the intersection 202 of a node (2) are checked. The loaded condition of a self-node is computed by invention of Claim 8, if it is over the threshold, a fixed time pause will be carried out, with a threshold [below], an installation execution demand is transmitted to node (2) 3, and installation is started.

[0018] Node (2) The installation control program 34 of 3 computes the loaded condition of a self-node by invention of Claim 8, ignited by reception of the installation execution demand from node (3) 4, if it is over the threshold, it will transmit a busy response, and with [control program] a threshold [below], it begins to transmit the demanded portion. [when the portion which transmits is small-scale, transmit all the portions at once, but] If the load at the time was computed by invention of Claim 8 after the division unit transmission after exceeding the amount of conventions by invention of Claim 7 and it is over the threshold when exceeding the amount of conventions, the notice of an installation stop will be transmitted and installation will be stopped. With a threshold [below], transmitting the remaining portion is continued. In one example of this invention, if the installation control program 44 of node (3) 4 also worked, the load at the time was computed by invention of Claim 8 after reception exceeding the amount of conventions and it is over the threshold, the notice of an installation stop will be transmitted to node (2) 3, and installation will be stopped. Node (2) The installation control program 34 of 3 will stop installation processing immediately, if the notice of an installation stop is received.

[0019] Node (3) It repeats that the installation control program 44 of 4 transmits the substance acknowledge request of OS extension to a server candidate node in order of a definition, and receives a response for every non-installed portion. [receive the non-installed response which shows not having the portion demanded from a certain server candidate's node, or] [receive the busy response which shows that the node concerned is in an overload state to an installation start demand even if it receives an installable response, or] If the notice of an installation stop which shows that the load of the node concerned increased during installation processing is received, a server candidate will be changed into the following node, if it finishes questioning all the server candidates briefly, the above will be repeated until the remainder of a non-installed portion is lost, and a fixed time pause will be carried out after that. Moreover, when oneself transmits the notice of an installation stop, a fixed time pause is carried out after that.

[0020] [moreover, the node which completed all the installations in other examples of this invention] It is for judging the opportunity which transmits an installable notice to all the nodes of a client candidate, and reduces ****** of the actual condition acknowledge request and the installable response which are performed with a client and a server, and stops an installation control program.

[0021] Drawing 4 is an example in which node (2) 3 which completed all the installations transmit an installable notice to node (3) 4 of a client candidate. Although drawing 3 showed the example which compounds the server management data set 37 from the server candidate of the installation management data set 35 and the installation object node management data set 36, in the example of drawing 4, the client management data set 38 is generated from the client object of the installation object node management data set 36. The contents record whether the notice of the completion of installation was received from the client candidate. The state where the check box 301 for a client candidate's nodes (3) is not checked shows the state where the notice of the completion of installation is not received from node (3) 4. If the notice of the completion of installation is received from all the client candidates of the client management data set 38, the node concerned does not need to exist as a server, and this will be used in order to know that the installation control program 34 may be stopped.

[0022] Node (2) if only the installation control program 34 of 3 finishes installing non-installed parallel DEBAGA The check box of parallel DEBAGA of the installation management data set 35, and the self-node of the server management data set 37 and the intersection 302 of parallel DEBAGA are checked. When it investigates whether all for [of a self-node] installation changed into the check state and becomes so, the notice of the completion of installation is transmitted as a client to all a server candidate's nodes, and an installable notice is transmitted to all the client candidates of the client management data set 38 as a server. In the example of drawing 4, the notice of the completion of installation is transmitted to a node (1), and an installable notice is transmitted to node (3) 4.

[0023] Node (3) As for the installation control program 44 of 4, if an installable notice is received, the notice origin of the server management data set 47 will change all the check boxes 311 of node (2) 3 into a check state. Then, it is not necessary to ****** an installable response with node (2) 3 and a substance acknowledge request by the processing which determines a server for node (3) 4 to install parallel DEBAGA.

[0024] Node (3) if only the installation control program 44 of 4 finishes installing non-installed parallel DEBAGA Since the check box of parallel DEBAGA of the installation management data set 45, and the self-node of the server management data set 47 and the intersection 312 of parallel DEBAGA were checked and all for [of a self-node] installation changed into the check state, The notice of the completion of installation is transmitted to a server candidate's node node (2) 3, node (3) 4 do not have a client candidate in the installation object node management data set 46, and in order not to make the substance of a client management data set, an installable notice does not transmit. Moreover, since installation is completed and the client which should be served does not exist, either, the installation control program 44 stops.

[0025] Node (2) [the installation control program 34 of 3] If the notice of the completion of installation is received, the notice origin of the client management data set 38 changes the check box 301 of node (3) 4 into a check state and all the check boxes of the client management data set 38 will be in a check state Since installation is completed and the client which should be served does not exist, either, it stops.

[0026] Invention of Claim 5 makes it possible to degenerate and to test a computation scale, even if installation of the extension is not completed. When the node management function in the node which supplied the parallel job assigns the node in a system, the check state of the installation management data set of each node is investigated, and only the node which installation of the extension required for execution of a parallel job has completed is assigned. However, since a node cannot be assigned as the node number which has completed installation is less than required quantity, one example of this invention explained below may also be needed.

[0027] In the one example of this invention, it is for securing the node number which a parallel job needs, and even if it uses invention of Claim 5, when a required node number cannot be secured, a node management function determines the node of the client candidate of installation, and transmits a compulsive installation demand to the node concerned.

[0028] For example, in the installation management data set 45 of node (3) 4 of drawing 3, the probability to carry out that non-installed OS extension, the command, and the execution monitor exist before parallel DEBAGA, and the installation control program 44 will install these in it first is large. Node (3) When the installation control program 44 of 4 operates ignited by reception of a compulsive installation demand, a server is looked for so that only the demanded portion may be installed. If the load of node (3) 4 is over the threshold, a busy response As a result, instancy, any of a server candidate -- although -- [a non-installed response / transceiver time with a server candidate] after progress if it is in the state where it does not install It is in the middle of installation, and when the load of node (3) 4 or a node (2) 3 server exceeds a threshold, after only the time which spent the non-installed response on ****** passes, it answers. If installation of the demanded portion is completed, the completion response of installation will be transmitted to the transmitting origin of a compulsive installation demand. <BR [0029]> [the node management function in the node which supplied the parallel job] A compulsive installation demand is simultaneously transmitted to the node of the number (failure is foreseen and more compulsive installation demands may be transmitted) corresponding to the node number of the insufficiency, and it waits for a response until it receives a number corresponding to specific monitor time or the node number of the insufficiency of completion responses of installation. Even if specific monitor time passes, when an insufficiency remains, abnormal termination of the parallel job is carried out.

[0030] CPU on other examples of plate Japan invention, and using the load of a node by installation processing, It measures to the channel and adapter to which a system disk is connected, and three kinds of resources of the communication line which constitutes a high-speed internal network. It is made one numeric value normalized in the same unit by weight attachment suitable for the significance of each resources, and the execution propriety of installation is judged as compared with a threshold. The case where OS has as a statistical information recording mechanism etc. is the technology of ******, even if OS is not equipped with the measurement mechanism of a load, it records measurement start time:Ts, and it sets accumulation:sigma of occupation time to 0. Assign by quota processing of resources and release time:Tf of time:Ta and resources is measured. Occupation time: It is easily realizable by measuring four kinds of time by accumulating Tf-Ta to sigma, computing the measuring time by Te-Ts from time:Te, and computing the quotient of sigma and the measuring time as a rate of a busy of the resources at the end of measurement, i.e., the next measurement start time, etc., and processing it.

[0031] The load for every resources: Since L1, L2, and L3 are measured and sum:L1xW1+L2xW2+L3xW3 of the product of weight:W1 [peculiar to resources], W2, and W3 are compared with a threshold, even if the unit of each load differs from a measuring method, the unit of weight is adjusted, and all the products can be normalized in the same unit. What is necessary is just to unite the unit of a threshold with the normalized unit.

[0032] [according to the above example / the premise to which the test and pre-preparation on various employment exist in front of the system which is the realistic solution method which shortens time until it starts full-scale calculation business, and starts full-scale calculation business] Installation of these and the extension is made concurrent and it has the effect of hiding the installation time of the extension on appearance.

[0033] When time to install in one node is set to Ti and all the node numbers are set to n, longest Tixn is the starting calculation making all installations complete. (If n man installs simultaneously, although time can be shortened to Ti, it is unreal.) on the other hand, It becomes the calculation Tixk=Tix {1+log2 (n)} Concerning making all installations of the k-1st power node of n= 2 complete as it is shown in drawing 5, when the case, i.e., the node which completed installation, where this invention operates on condition of best serves as a server one after another. (log2 is taken as the logarithm which uses 2 as a bottom) What is necessary is just to also carry out the node (1) which has most client candidates in this case against a k-1=log2 (n) node. For example, when installation of one node takes 1 hour and it makes installation of 1,024 nodes complete, if it installs one node at a time, it will take 1,024 hours (for 43 days), but if the node which completed installation becomes a server one after another, it will only take 11 hours.

[0034] In order to acquire a number effect like the above-mentioned example by an actual configuration, it is necessary to have the capacity that all the nodes can be ******(ed) on a high-speed internal network in the final stage of installation. Although the parallel computer is equipped with such a high-speed set work from the purpose, in the computer network which connected computers by the usual communication line, it will be restricted to the capacity of communication-ized latitude lines. However, the deadlock by load concentration is avoidable by using this invention.

[0035]

[Effect of the Invention] This invention shortens installation time by the judgment for installation, and parallelization of processing as above-mentioned.

[Brief Description of the Drawings]

[Drawing 1] Drawing 1 is the block diagram showing that it is the form to which between the nodes in which the parallel computer system which is the target of this invention has the system disk which became independent each one was connected in the high-speed internal network.

[Drawing 2] Drawing 2 is the figure showing the example which classifies into a fundamental part and the extension the object which should be installed.

[Drawing 3] Drawing 3 is a figure explaining an example for explaining operation which installs by negotiating with a server candidate's node from the node used as the client of installation.

[Drawing 4] Drawing 4 is a figure which illustrates an example for explaining operation which passes the notice which reduces the negotiations which look for a server to a client candidate's node, and the stop operation of an installation control program from the server of installation, and the node which can change.

[Drawing 5] Drawing 5 is a figure where the node which completed installation shows operation which becomes a server one after another, and explains the effect of this invention. .

[Explanations of letters or numerals]

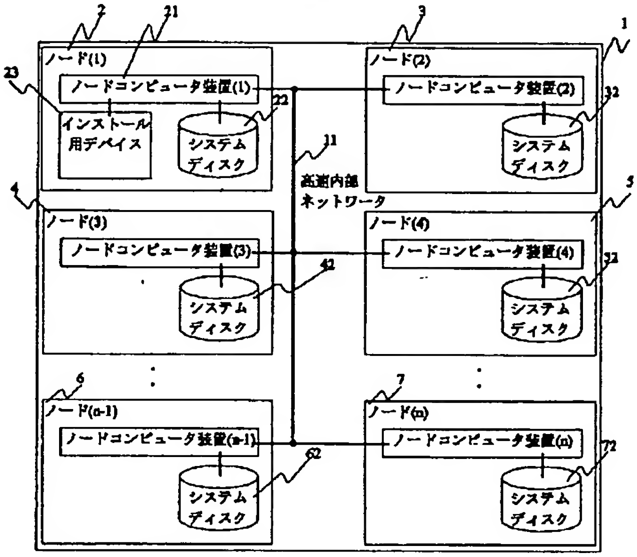
1 -- Parallel computer system
11 -- High-speed internal network
2 -- Node (1)
21 -- Node computer equipment (1)
22 -- (node (1)) System disk
23 -- Device for installation
3 -- Node (2)
32 -- (node (2)) System disk
35 -- (node (2)) Installation management data set
36 -- (node (2)) Installation object node management data set
37 -- (node (2)) Server management data set
38 -- (node (2)) Client management data set
4 -- Node (3)
42 -- (node (3)) System disk
44 -- (node (3)) Installation control program
45 -- (node (3)) Installation management data set
46 -- (node (3)) Installation object node management data set
47 -- (node (3)) Server management data set
5 -- Node (4)
52 -- (node (4)) System disk
6 -- Node (n-1)
62 -- (node (n-1)) System disk
7 -- Node (n)
72 -- (node (n)) System disk
101 -- OS nucleus
102 -- OS extension
103 -- Command
104 -- Library
111 -- Node control (program)
112 -- Execution monitor
113 -- Communication library
114 -- Parallel DEBAGA
201 -- Check box of whether OS extension is installed in the node (3)
202 -- Check box of whether OS extension is installed in the node (2)
211 -- Check box of whether OS extension is installed in the node (2)
301 -- Check box of whether the node (3) has completed all installations
302 -- Check box of whether parallel DEBAGA is installed in the node (2)

311 -- All the check boxes of the portion installed in the node (2)

312 -- Check box of whether parallel DEBAGA is installed in the node (3)

[Drawing 1]

図1


1
2
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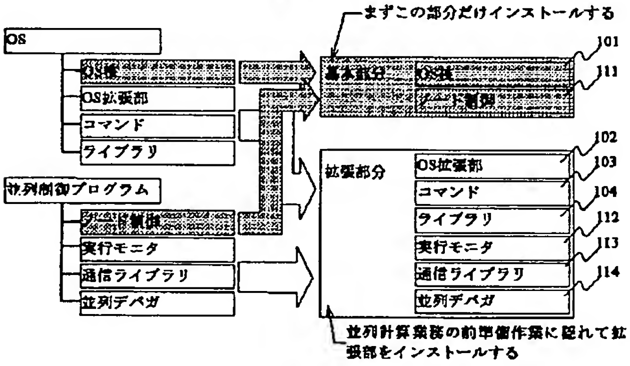
ノードコンピュータ装置(n)

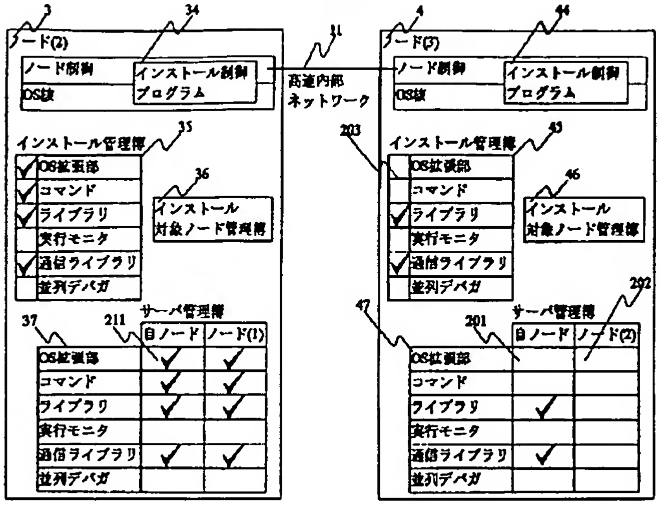
[Drawing 2]

図2


まずこの部分だけインストールする
OS
OS核
OS拡張部
コマンド
ライブラリ
並列制御プログラム
ノード制御
実行モニタ
通信ライブラリ
並列デバガ
基本部分
OS核
ノード制御
101
111
拡張部分
OS拡張部
コマンド
ライブラリ
実行モニタ
通信ライブラリ
並列デバガ
102
103
104
112
113
114
並列計算業務の前準備作業に紛れて拡張部をインストールする

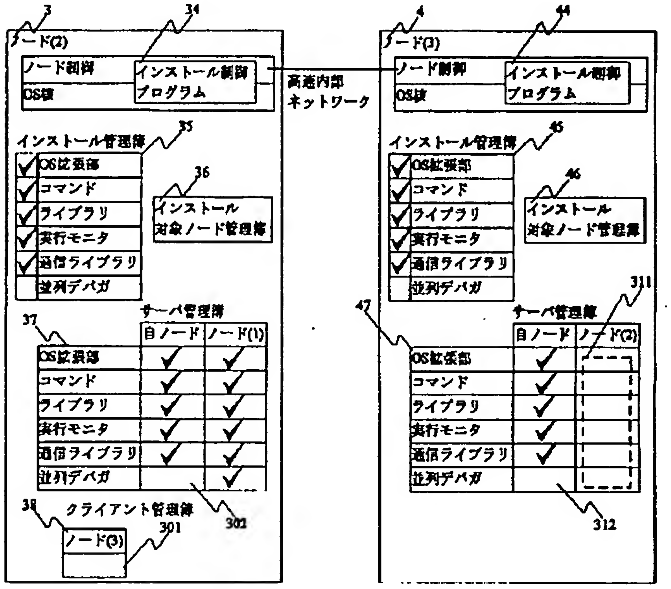
[Drawing 3]

図3


3
34
ノード(2)
ノード制御
OS核
インストール制御プログラム
11
高速内部ネットワーク
4
44
ノード(3)
ノード制御
OS核
インストール制御プログラム
インストール管理簿
35
OS拡張部
コマンド
ライブラリ
実行モニタ
通信ライブラリ
並列デバガ
36
インストール対象ノード管理簿
203
45
46
サーバ管理簿
37
211
自ノード
ノード(1)
47
201
202
ノード(2)

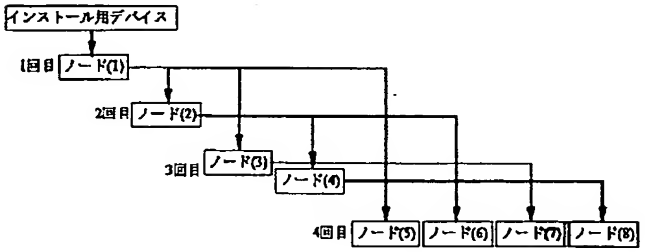
[Drawing 4]

図4


3
34
ノード(2)
ノード制御
OS核
インストール制御プログラム
高速内部ネットワーク
4
44
ノード(3)
ノード制御
OS核
インストール制御プログラム
インストール管理簿
35
45
OS拡張部
コマンド
ライブラリ
実行モニタ
通信ライブラリ
並列デバガ
36
46
インストール対象ノード管理簿
311
サーバ管理簿
37
47
自ノード
ノード(1)
ノード(2)
38
クライアント管理簿
ノード(3)
301
302
312

[Drawing 5]

図5


インストール用デバイス
1回目
ノード(1)
2回目
ノード(2)
3回目
ノード(3)
ノード(4)
4回目
ノード(5)
ノード(6)
ノード(7)
ノード(8)

回目	動作するサーバ→クライアント	ノード数	サーバ	クライアント
1	インストール用デバイス→ノード(1)	1	0	1
2	ノード(1)→ノード(2)	2	1	1
3	ノード(1)→ノード(3)、ノード(2)→ノード(4)	4	2	2
4	ノード(1)→ノード(5)、…、ノード(4)→ノード(8)	8	4	4
…				
i	ノード(1)→ノード($1+2^{i-2}$)、…、ノード(i)→ノード($i+2^{i-2}$)	2^{i-1}	2^{i-2}	2^{i-2}

[Translation done.]